11 AK-33

Service Manual

1. INTRODUCTION ____ *4*
2. SMALL SIGNAL PART WITH TDA8885 ____ *4*
2.1. Vision IF amplifier ____ **4**
2.2. Video Switches ____ **5**
2.3. Sound Circuit ____ **5**
2.4. Synchronisation circuit ____ **5**
2.5. Chroma and Luminance processing ____ **6**
2.6. Colour Decoder ____ **6**
2.7. PICTURE IMPROVEMENT FEATURES ____ **7**
2.8. RGB output circuit and black-current stabilisation ____ **7**
2.9. EAST – WEST OUTPUT STAGE ____ **8**
3. TUNER ____ *8*
4. VIDEO SWITCH TEA6415C ____ *9*
5. MULTI STANDARD SOUND PROCESSOR ____ *9*
6. SOUND OUTPUT STAGE WITH TDA 7265 ____ *9*
7. VERTICAL OUTPUT STAGE WITH STV 9379 ____ *10*
8. VIDEO OUTPUT AMPLIFIER TDA6108 ____ *10*
9. COMBFILTER TDA 9181 ____ *10*
10. POWER SUPPLY (SMPS) ____ *10*
11. POWER FACTOR CORRECTION ____ *10*
12. MICROCONTROLLER SDA555X ____ *10*
12.1. General Features ____ **10**
12.2. External Crystal and Programmable clock speed ____ **10**
12.3. Microcontroller Features ____ **10**
12.4. Memory ____ **11**
12.5. Display Features ____ **11**
12.6. ROM Characters ____ **11**
12.7. Acquisition Features ____ **11**
12.8. Ports ____ **11**
*13. SERIAL ACCESS CMOS 8K (1024*8) EEPROM ST24C08* ____ *12*
14. CLASS AB STEREO HEADPHONE DRIVER TDA1308 ____ *12*
15. SAW FILTERS ____ *12*
16. IC DESCRIPTIONS AND INTERNAL BLOCK DIAGRAM ____ *12*
16.1. TDA8885: ____ **12**
16.1.1. GENERAL DESCRIPTION ____ 12
16.1.2. FEATURES ____ 12
16.1.3. Pin Description ____ 13

16.2. UV1315, UV1316 15
16.2.1. General description of UV1315: 15
16.2.2. Features of UV1315: 15
16.2.3. General description of UV1316: 15
16.2.4. Features of UV1316: 15

16.3. TEA6415C: 16
16.3.1. General Description: 16
16.3.2. Features: 16

16.4. TDA7265: 17
16.4.1. Features: 17
16.4.2. Pinning: 17

16.5. TDA6108Q: 17
16.5.1. Features: 17

16.6. 74 HCT 32 18
16.6.1. PINNING 18

16.7. MC44608 18
16.7.1. General description: 18
16.7.2. General Features 18

16.8. SDA5555: 19
16.8.1. General description: 19

16.9. TDA9181: 20
16.9.1. General Features: 20
16.9.2. Limits: 20

16.10. TCD1102: 21
16.10.1. Description 21
16.10.2. Applications 21
16.10.3. General features: 21

16.11. ST24C08: 21
16.11.1. General description: 21
16.11.2. Features: 21

16.12. TDA1308: 22
16.12.1. Features: 22

16.13. PCF8583: 22
16.13.1. FEATURES 22
16.13.2. GENERAL DESCRIPTION 23

16.14. MC33260: 23
16.14.1. General Features: 23
16.14.2. Safety Features: 23
16.14.3. LIMITS: 23
16.14.4. PINNING 23

16.15. STV9379: 24
16.15.1. DESCRIPTION 24
16.15.2. PINNING 24

16.16. MSP34XX : 24

MSP3410D 24

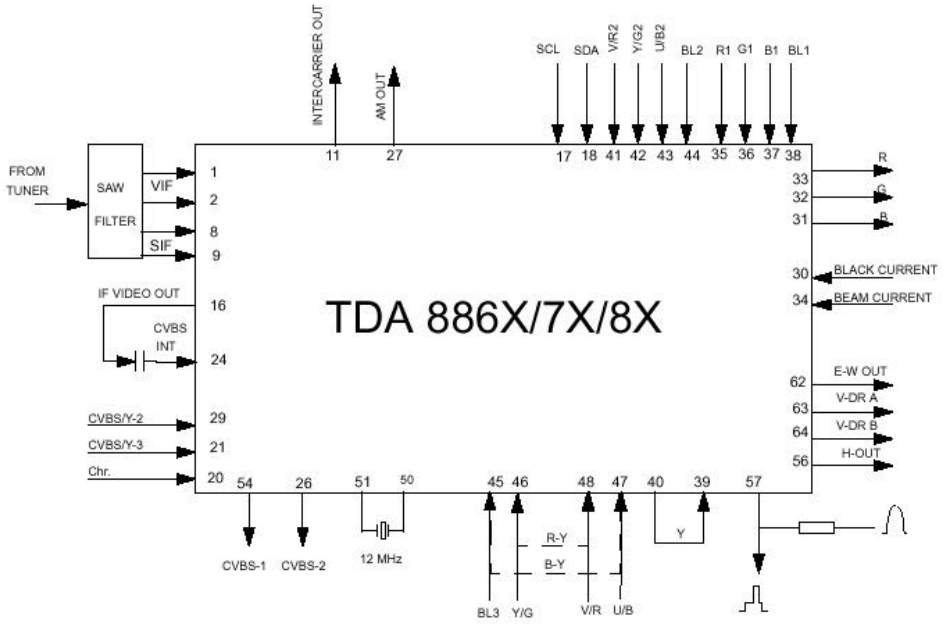
16.17. LM358N: 26
16.17.1. General Description 26
16.17.2. Unique Characteristics 26
16.17.3. Advantages 26
16.17.4. Features 26

1. INTRODUCTION

11AK33 is a 110ø chassis capable of driving 28-29",32",33" tubes at appropriate currents The chassis is a Frequency Controlled Tuning (PLL) and control system for multi-standard TV receivers with on-screen-display (OSD) for all relevant control functions. The system is based on the 'one-chip' I²C bus controlled video processing / deflection IC TDA8885 which also controls sound.
German stereo and Nicam is detected and processed by the MSP 3410 G. Dolby sound is processed by MSP 3452 G, virtual dolby by MSP 3411G, BTSC Stereo by MSP 3430G IC's by option. All sound processors also control the sound volume, balance, tone and spatial stereo effect.
The user-interface is menu based control system with cursor keys. Only for some functions the colour keys are needed: This means that some of the functions can also be operated from the local keyboard (i.e. Vol -, Vol +, P -, P+ and M).
Teletext is done by the microcontroller on-chip teletext module.

2. SMALL SIGNAL PART WITH TDA8885

The TDA8885 combine all small signal functions required for a colour TV receiver.



2.1. Vision IF amplifier

The IF-amplifier contains 3 ac-coupled control stages with a total gain control range, which is higher then 66 dB. The sensitivity of the circuit is comparable. The video signal is demodulated by means of an alignment-free PLL carrier regenerator with an internal VCO. This VCO is calibrated by means of a digital control circuit, which uses the clock frequency of the m-Controller/Teletext decoder as a reference. The frequency setting for the various standards (33.4, 33.9, 38, 38.9, 45.75 and 58.75 MHz) is realised via the I 2 C-bus. To get a good performance for phase modulated carrier signals the control speed of the PLL can be increased by means of the FFI bit. The AFC output is generated by the digital control circuit of the IF-PLL demodulator and can be read via the I 2 C bus. For fast search tuning systems the window of the AFC can be increased with a factor 3. The setting is realised with the AFW bit. The AGC-detector operates on top sync and top white-level. The demodulation polarity is switched via the I 2 C-bus. The AGC detector capacitor is integrated. The time-constant can be chosen via the I 2 C-bus. The time-constant of the AGC system during positive modulation is rather long to avoid visible variations of the signal amplitude. To improve the speed of the AGC system a circuit has been included which detects whether the AGC detector is activated every frame period. When during 3 field periods no action is detected the speed of the system is increased. For signals without peak white information

the system switches automatically to a gated black level AGC. Because a black level clamp pulse is required for this way of operation the circuit will only switch to black level AGC in the internal mode. The circuit contains a video identification circuit, which is independent of the synchronisation circuit. Therefore search tuning is possible when the display section of the receiver is used as a monitor. However, this Ident circuit cannot be made as sensitive as the slower sync Ident circuit (SL) and we use both Ident outputs to obtain a reliable search system. The Ident output is supplied to the tuning system via the I 2 C-bus. The input of the identification circuit is connected to pin 24, the internal CVBS input. This has the advantage that the Ident circuit can also be made operative when a scrambled signal is received (descrambler connected between the IF video output (pin 16) and pin 24). A second advantage is that the Ident circuit can be used when the IF amplifier is not used The video Ident circuit can also be used to identify the selected CBVS or Y/C signal. The switching between the 2 modes can be realised with the VIM bit. The IC contains a group delay correction circuit, which can be switched between the BG and a flat group delay response characteristic. This has the advantage that in multi-standard receivers no compromise has to be made for the choice of the SAW filter. Also the sound trap is integrated within the IC .The centre frequency of the trap can be switched via the I 2 C-bus. For mono-FM versions it is possible to obtain a demodulated IF video signal which has not passed the sound trap so that an external stereo decoder can be driven. This function is selected by means of the ICO bit (sub-address 28H). The signal is available on pin 27 (audio output pin when ICO = 0). The S/N ratio of the selected video signal can be read via the bits SN1/SN0 in sub-address 03H.

2.2. Video Switches

The circuit has an input for the internal CVBS signal and 2 inputs for external CVBS or Y signals. The circuit has only 1 chroma input so that it is not possible to apply 2 separate Y/C inputs. The switch configuration is given in Fig. A. The selection of the various sources is made via the I 2 C-bus. The QFP-64 version has 2 independently switchable outputs. The CVBS1O output is identical to the selected signal that is supplied to the internal video processing circuit and can therefore be used as source signal for a teletext decoder. Both CVBS outputs have an amplitude of 2.0 VP-P . The CVBS2O output can for instance be used as drive signal for a PIP decoder. If the Y/C-3 signal is selected for one of the outputs the luminance and chrominance signals are added so that a CVBS signal is obtained again.

2.3. Sound Circuit

The sound IF amplifier is similar to the vision IF amplifier and has a gain control range of about 66 dB. The AGC circuit is related to the SIF carrier levels (average level of AM or FM carriers) and ensures a constant signal amplitude of the AM demodulator and the QSS mixer. A multiplier realises the single reference QSS mixer. In this multiplier the SIF signal is converted to the intercarrier frequency by mixing it with the regenerated picture carrier from the VCO. The mixer output signal is supplied to the output via a high-pass filter for attenuation of the residual video signals. With this system a high performance hi-fi stereo sound processing can be achieved. To optimise the performance of the demodulator the offset can be compensated by means of an I 2 C-bus setting. The AM sound demodulator is realised by a multiplier. The modulated sound IF signal is multiplied in phase with the limited SIF signal. The demodulator output signal is supplied to the output via a low-pass filter for attenuation of the carrier harmonics. The AM signal is supplied to the output (pin 27) via the volume control. It is possible to get the AM output signal (not controlled on amplitude) on the QSS intercarrier output. The selection is made by means of the AM bit in sub-address 29H. Another possibility is that pin 11 can be used as external audio input pin and pin 49 can be used as (non-controlled) AM output pin. This can be realised by means of the setting the control bits CMB0 and CMB1 in sub-address 22H.

2.4. Synchronisation circuit

The sync separator is preceded by a controlled amplifier, which adjusts the sync pulse amplitude to a fixed level. These pulses are fed to the slicing stage, which is operating at 50% of the amplitude. The separated sync pulses are fed to the first phase detector and to the coincidence detector. This coincidence detector is used to detect whether the line oscillator is synchronised with the incoming signal and can also be used for transmitter identification. This circuit can be made less sensitive by means of the STM bit. This mode can be used during search tuning to avoid that the tuning system will stop at very weak input signals. The first PLL has a very high statically steepness so that the phase of the picture is independent of the line frequency. The horizontal drive signal is generated by an internal VCO, which is running at a frequency of 25 MHz. This oscillator is stabilised to that frequency by using the 12 MHz frequency of the crystal oscillator as a reference. The time-constant of the first loop

can be forced by the I 2 C-bus (fast or slow). If required the IC can select the time-constant depending on the noise content of the incoming video signal. The horizontal output signal is generated by means of a second loop, which compares the phase of the internal oscillator signal with the phase of the incoming flyback pulse. The time-constant of this loop is connected externally and can be used as input for a dynamic horizontal phase correction. To obtain a smooth switch-on and switch-off behaviour of the horizontal output stage the horizontal drive signal is switched-on and off via the soft-start/soft-stop procedure. This function is realised by means of a variation of the TON of the horizontal drive pulse. When the soft-start procedure is completed the horizontal output is gated with the flyback pulse so that the horizontal output transistor cannot be switched-on during the flyback time. An additional function of the IC is the 'low-power start-up' feature. For this function a supply voltage with a value between 3 and 5 V must be available at the start-up pin (required current 5 mA typical). When all sub-address bytes have been sent and the POR and XPR flags have been cleared, the horizontal output can be switched-on via the STB-bit (sub-address 24H). In this condition the horizontal drive signal has the nominal TOFF and the TON grows gradually from zero to the nominal value as indicated in the soft-start behaviour. As soon as the 8 V supply is present the switch-on procedure (e.g. closing of the second loop) is continued. The presence of the 8 V supply voltage is indicated by the SUP bit in the I 2 C-bus output byte 02. The circuit generates a vertical sync pulse. This pulse can be selected on pin 49 via the bits CMB1 and CMB0. In the 100 Hz input processor versions the vertical sync pulse is available on pin 63 and the horizontal pulse on pin 56. Via the I C-bus adjustments can be made of the horizontal and vertical geometry. The vertical sawtooth generator drives the vertical output drive circuit, which has a differential output current. For the E-W drive a single ended current output is available. A special feature is the zoom function for both the horizontal and vertical deflection and the vertical scroll function. When the horizontal scan is reduced to display 4 : 3 pictures on a 16 : 9 picture tube an accurate video blanking can be switched on to obtain well-defined edges on the screen. Overvoltage conditions (X-ray protection) can be detected via the EHT tracking pin. When an overvoltage condition is detected the horizontal output drive signal will be switched-off via the slow stop procedure but it is also possible that the drive is not switched-off and that just a protection indication is given in the I 2 C-bus output bytes. The choice is made via the input bit PRD. When PRD = 1 and an overvoltage is detected the drive is switched-off and the STB bit is set to 0. Switching on of the drive is only possible when the XPR flag is cleared. The IC has a second protection input on the j2 filter capacitor pin. When this input is activated the drive signal is switched-off immediately and switched-on again via the slow start procedure. For this reason this protection input can be used as 'flash protection'. The drive pulses for the vertical sawtooth generator is obtained from a vertical countdown circuit. This countdown circuit has various windows depending on the incoming signal (50 Hz or 60 Hz and standard or non-standard). The countdown circuit can be forced in various modes by means of the I 2 C-bus. During the insertion of RGB signals the maximum vertical frequency is increased to 72 Hz so that the circuit can also synchronise on signals with a higher vertical frequency like VGA. To obtain short switching times of the countdown circuit during a channel change the divider can be forced in the search window by means of the NCIN bit. The vertical deflection can be set in the de-interlace mode via the I 2 C bus.

2.5. Chroma and Luminance processing

The circuit contains a chroma bandpass and trap circuit. The filters are realised by means of gyrator circuits and they are automatically calibrated by comparing the tuning frequency with the reference frequency of the decoder. The luminance delay line and the delay for the peaking circuit are also realised by means of gyrator circuits. The centre frequency of the chroma bandpass filter is switchable via the I 2 C-bus so that the performance can be optimised for 'front-end' signals and external CVBS signals. During SECAM reception the centre frequency of the chroma trap is reduced to get a better suppression of the SECAM carrier frequencies.

2.6. Colour Decoder

The colour decoder can decode PAL, NTSC and SECAM signals. The internal clock signals for the various colour standards are generated by means of an internal VCO, which uses the 12 MHz crystal frequency as a reference. Under bad-signal conditions (e.g. VCR-playback in feature mode), it may occur that the colour killer is activated although the colour PLL is still in lock. When this killing action is not wanted it is possible to overrule the colour killer by forcing the colour decoder to the required standard and to activate the FCO-bit (Forced Colour On) in subaddress 21H. The IC contains an

Automatic Colour Limiting (ACL) circuit which is switchable via the I 2 C-bus and which prevents that oversaturation occurs when signals with a high chroma-to-burst ratio are received. The ACL circuit is designed such that it only reduces the chroma signal and not the burst signal. This has the advantage that the colour sensitivity is not affected by this function. The SECAM decoder contains an auto-calibrating PLL demodulator which has two references, viz: the divided 12 MHz reference frequency of the crystal oscillator which is used to tune the PLL to the desired free-running frequency and the bandgap reference to obtain the correct absolute value of the output signal. The VCO of the PLL is calibrated during each vertical blanking period, when the IC is in search or SECAM mode. The reference frequency of the colour decoder is fed to the Fsc output (pin 49) and can be used to tune an external comb filter. The base-band delay line is integrated. The demodulated colour difference signals are internally supplied to the delay line. The colour difference matrix switches automatically between PAL/SECAM and NTSC, however, it is also possible to fix the matrix in the PAL standard.

2.7. PICTURE IMPROVEMENT FEATURES

In the TDA 8885 series various picture improvement features have been integrated. These features are:
-Video dependent coring in the peaking circuit. The coring can be activated only in the low-light parts of the screen. This effectively reduces noise while having maximum peaking in the bright parts of the picture.
-Colour Transient Improvement (CTI). This circuit improves the rise and fall times of the colour difference signals. The function is realised by using delay cells with a length of 300 ns.
-Black-stretch. This circuit corrects the black level for incoming video signals, which have a deviation between the black level and the blanking, level (back porch). The time constant for the black stretcher is realised internally
-Blue-stretch. This circuit is intended to shift colour near ‘white’ with sufficient contrast values towards more blue to obtain a brighter impression of the picture
-White-stretch. This function adapts the transfer characteristic of the luminance amplifier in a non-linear way dependent on the picture content. The system operates such that maximum stretching is obtained when signals with a low video level are received. For bright pictures the stretching is not active.
-Dynamic skin tone (flesh) control. This function is realised in the YUV domain by detecting the colourss near to the skin tone. The correction angle can be controlled via the I^2 C-bus.

2.8. RGB output circuit and black-current stabilisation

The ICs have a very flexible control circuit for RGB and YUV input signals, which has the following features:
· Input which can be used for YUV or RGB input signals and as YUV interface. The selection of the various modes can be realised via the I^2 C-bus. For the YUV input 2 different input signal conditions can be chosen. It is also possible to connect the synchronisation circuit to the incoming Y input signal. This input signal can be controlled on saturation, contrast and brightness.
· The RGB-1 input which is intended for OSD/text signals and which can be controlled on contrast and brightness. By means of the IE1 bit the insertion blanking can be switched on or off. Via the IN1 bit it can be read whether the insertion pin has a high level or not. It is also possible to convert the incoming RGB-1 signal to a YUV signal. The resulting signal is supplied to the YUV outputs.
· The TDA 888X versions have an additional YUV or RGB input which can be controlled on contrast, saturation and brightness. The various input signal conditions are given. The insertion blanking of this input can be switched-off by means of the IE2 bit. Via the IN2 bit it can be read whether the insertion pin has a high level or not. The control circuit has a half tone input, which can be used to reduce the contrast setting during mixed mode operation for teletext and OSD signals. The output signal has amplitude of about 2 V black-to-white at nominal input signals and nominal settings of the controls. To increase the flexibility of the IC it is possible to insert OSD and/or teletext signals directly at the RGB outputs. This insertion mode is controlled via the insertion input (pin 38). This blanking action at the RGB outputs has some delay, which must be compensated externally.
To obtain an accurate biasing of the picture tube the ‘Continuous Cathode Calibration’ system has been included in this IC. Via the I^2 C-bus a black level offset can be made with respect to the level which is generated by the black current stabilisation system. In this way different colour temperatures can be obtained for the bright and the dark part of the picture.

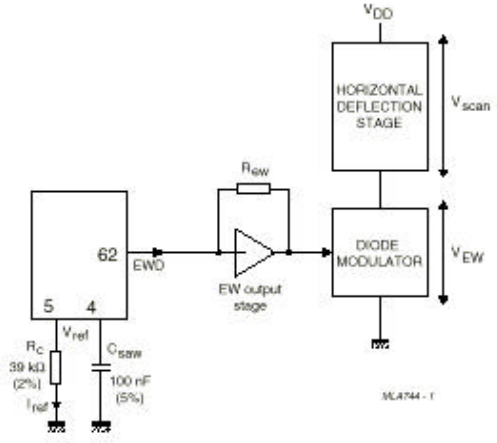
The black current stabilisation system checks the output level of the 3 channels and indicates whether the black level of the highest output is in a certain window (WBC-bit) or below or above this window (HBC-bit). This indication can be read from the I^2 C-bus and can be used for automatic adjustment of the Vg2 voltage during the production of the TV receiver.
The control circuit contains a beam current limiting circuit and a peak white limiting circuit. The peak white level is adjustable via the I^2 C-bus. To prevent that the peak white limiting circuit reacts on the high frequency content of the video signal a low-pass filter is inserted in front of the peak detector. The circuit also contains a soft-clipper, which prevents that the high frequency peaks in the output signal become too high. The difference between the peak white limiting level and the soft clipping level is adjustable via the I^2 C-bus in a few steps.
During switch-off of the TV receiver, the black current control circuit generates a fixed beam current. This current ensures that the picture tube capacitance is discharged. During the switch-off period the vertical deflection can be placed in an overseen position so that the discharge is not visible on the screen.

2.9. EAST – WEST OUTPUT STAGE

In order to obtain correct tracking of the vertical and horizontal EHT-correction, the EW output stage should be dimensioned as illustrated in Figure. Resistor REW determines the gain of the EW output stage. Resistor Rc determines the reference current for both the vertical sawtooth generator and the geometry processor. The preferred value of Rc is 39 kW which results in a reference current of 100 mA (Vref = 3.9 V).
The value of REW must be:

$R_{EW} = R_C * (V_{scan} / (18* V_{ref}))$

Example: With Vref = 3.9 V; Rc =39 kohm and Vscan = 120 V then REW =68 kohm



3. TUNER
PLL tuner is used as a tuner.
UV1316 (VHF/UHF) is used as a PLL tuner. For only PALM/N, NTSC M applications UV 1336 are used as the PLL tuner.

Channel coverage of UV1316:

	OFF-AIR CHANNELS		CABLE CHANNELS
BAND	CHANNELS	FREQUENCY RANGE (MHz)	CHANNELS
FREQUENCY RANGE (MHz)			
Low Band 69.25 to 154.25	E2 to C	48.25 to 82.25 **(1)**	S01 to S08

Mid Band 161.25 to 439.25	E5 to E12	175.25 to 224.25	S09 to S38
High Band 447.25 to 463.25	E21 to E69	471.25 to 855.25 **(2)**	S39 to S41

(1). Enough margin is available to tune down to 45.25 MHz.
(2). Enough margin is available to tune up to 863.25 MHz.

Noise	Typical	Max.	**Gain**	Min.	Typical
Low band	: 5dB	9dB	All channels	: 38dB	44dB
Mid band	: 5dB	9dB	Gain Taper (of-air channels)	: -	-
High band	: 6dB	9dB			

Channel Coverage UV1336:

BAND	CHANNELS	FREQUENCY RANGE (MHz)
Low Band	2 to D	55.25 to 139.25
Mid Band	E to PP	145.25 to 391.25
High Band	QQ to 69	397.25 to 801.25

Noise is typically 6dB for all channels. **Gain** is minimum 38dB and maximum 50dB for all channels.

4. VIDEO SWITCH TEA6415C

In case of three or more external sources are used, the video switch IC TEA6415C is used. The main function of this device is to switch 8 video-input sources on the 6 outputs.
Each output can be switched on only one of each input. On each input an alignment of the lowest level of the signal is made (bottom of sync. top for CVBS or black level for RGB signals).
Each nominal gain between any input and output is 6.5dB.For D2MAC or Chroma signal the alignment is switched off by forcing, with an external resistor bridge, 5VDC on the input. Each input can be used as a normal input or as a MAC or Chroma input (with external Resistor Bridge). All the switching possibilities are changed through the BUS.
Driving 75ohm load needs an external resistor.
It is possible to have the same input connected to several outputs.

5. MULTI STANDARD SOUND PROCESSOR

The MSP 34x0D is designed to perform demodulation of FM or AM-Mono TV sound. Alternatively, two-carrier FM systems according to the German or Korean terrestrial specs or the satellite specs can be processed with the MSP 34x0D. Digital demodulation and decoding of NICAM-coded TV stereo sound, is done only by the MSP 3410. The MSP 34x0D offers a powerful feature to calculate the carrier field strength which can be used for automatic standard detection (terrestrial) and search algorithms (satellite).

6. SOUND OUTPUT STAGE WITH TDA 7265

TDA7265 is a class AB dual Audio power amplifier assembled in the multiwatt package.
Mute stand-by function of the audio amplifier can be described as the following; the pin 5 (MUTE/STAND-BY) controls the amplifier status by two different thresholds, referred to +Vs. When Vpin (5) higher than (+Vs - 2.5V) the amplifier is in Stand-by mode and the final stage generators are off. When Vpin (5) is between (+Vs – 2.5V) and (+Vs – 6V) the final stage current generators are switched on and the amplifier is in mute mode. When the Vpin (5) is lower than +Vs – 6V the amplifier is play mode.

7. VERTICAL OUTPUT STAGE WITH STV 9379

The IC TDA9379FA is the vertical deflection booster circuit. Two supply voltages, +12V and –12V are needed to scan the inputs VERT+ and VERT-, respectively. And a third supply voltage, +45V for the flyback limiting are needed. The vertical deflection coil is connected in series between the output and feedback to the input.

8. VIDEO OUTPUT AMPLIFIER TDA6108

The TDA6107/08Q includes three video output amplifiers in a SIL 9 MP (Single in Line 9 pins Medium Power) package SOT111BE, using high-voltage DMOS technology, and is intended to drive the three cathodes of a colour picture tube.
In contrast to previous types of DMOS video amplifiers, all external resistors (Rf, Ri and Ra) are integrated, so the gain is fixed.
To obtain maximum performance, the amplifier should be used with black-current control and mounted on the CRT panel.

9. COMBFILTER TDA 9181

The TDA 9181 is an adaptive PAL/NTSC comb filter with two internal delay lines, filters, clock control, and input clamps. Video standards PAL B, G, H, I, M and N NTSC M are supported.
Two CVBS input signals can be selected by means of input switch.
In addition to the comb filter the circuit contains an output switch so that a selection can be made between the combed CVBS signal and an external Y/C signal.
The supply voltage is 5V.

10. POWER SUPPLY (SMPS)

The DC voltages required at various parts of the chassis are provided by an SMPS transformer controlled by the IC MC44608, which is designed for driving, controlling and protecting switching transistor of SMPS. The transformer produces 150V for FBT input, ? 14V for audio output IC, S+3.3, S+5V and 8V for TDA8885.

11. POWER FACTOR CORRECTION

The MC33260 is a controller for Power Factor Correction pre-converters meeting international standard requirements in electronic ballast and off–line power conversion applications. Designed to drive a free frequency discontinuous mode, it can also be synchronised and in any case, it features very effective protections that ensure a safe and reliable operation.

12. MICROCONTROLLER SDA555X

12.1. General Features

• Feature selection via special function register
• Simultaneous reception of TTX, VPS, PDC, and WSS (line 23)
• Supply Voltage 2.5 and 3.3 V
• ROM version package P-SDIP 52
• ROMless version package P-LCC84

12.2. External Crystal and Programmable clock speed

• Single external 6MHz crystal, all necessary clocks are generated internally
• CPU clock speed selectable via special function registers.
• Normal Mode 33.33 MHz CPU clock, Power Save mode 8.33 MHz

12.3. Microcontroller Features

• 8bit 8051 instruction set compatible CPU.
• 33.33-MHz internal clock (max.)
• 0.360 ms (min.) instruction cycle
• Two 16-bit timers
• Watchdog timer
• Capture compare timer for infrared remote control decoding
• Pulse width modulation unit (2 channels 14 bit, 6 channels 8 bit)
• ADC (4 channels, 8 bit)
• UART

12.4. Memory

- **Non-multiplexed 8-bit data and 16 … 20-bit address bus (ROMless Version)**
- **Memory banking up to 1Mbyte (ROMless version)**
- Up to 128 Kilobyte on Chip Program ROM
- Eight 16-bit data pointer registers (DPTR)
- 256-bytes on-chip Processor Internal RAM (IRAM)
- 128bytes extended stack memory.
- Display RAM and TXT/VPS/PDC/WSS-Acquisition-Buffer directly accessible via MOVX
- UP to 16KByte on Chip Extended RAM (XRAM) consisting of;
- 1 Kilobyte on-chip ACQ-buffer-RAM (access via MOVX)
- 1 Kilobyte on-chip extended-RAM (XRAM, access via MOVX) for user software
- 3 Kilobyte Display Memory

12.5. Display Features

- ROM Character set supports all East and West European Languages in single device
- Mosaic Graphic Character Set
- Parallel Display Attributes
- Single/Double Width/Height of Characters
- Variable Flash Rate
- Programmable Screen Size (25 Rows x 33...64 Columns)
- Flexible Character Matrixes (HxV) 12 x 9...16
- Up to 256 Dynamical Redefinable Characters in standard mode; 1024 Dynamical Redefinable Characters in Enhanced Mode
- CLUT with up to 4096 colour combinations
- Up to 16 Colours per DRCS Character
- One out of Eight Colours for Foreground and Background Colours for 1-bit DRCS and

12.6. ROM Characters

- Shadowing
- Contrast Reduction
- Pixel by Pixel Shiftable Cursor With up to 4 Different Colours
- Support of Progressive Scan and 100 Hz.
- 3 X 4Bits RGB-DACs On-Chip
- Free Programmable Pixel Clock from 10 MHz to 32MHz
- Pixel Clock Independent from CPU Clock
- Multinorm H/V-Display Synchronisation in Master or Slave Mode

12.7. Acquisition Features

- Multistandard Digital Data Slicer
- Parallel Multi-norm Slicing (TTX, VPS, WSS, CC, G+)
- Four Different Framing Codes Available
- Data Caption only limited by available Memory
- Programmable VBI-buffer
- Full Channel Data Slicing Supported
- Fully Digital Signal Processing
- Noise Measurement and Controlled Noise Compensation
- Attenuation Measurement and Compensation
- Group Delay Measurement and Compensation
- Exact Decoding of Echo Disturbed Signals

12.8. Ports

- One 8-bit I/O-port with open drain output and optional I 2 C Bus emulation support (Port0)
- Two 8-bit multifunction I/O-ports (Port1, Port3)
- One 4-bit port working as digital or analogue inputs for the ADC (Port2)
- One 2-bit I/O port with secondary functions (P4.2, 4.3, 4.7)
- One 4-bit I/O-port with secondary function (P4.0, 4.1, 4.4) (Not available in P-SDIP 52)

13. SERIAL ACCESS CMOS 8K (1024*8) EEPROM ST24C08

The ST24C08 is a 8Kbit electrically erasable programmable memory (EEPROM), organised as 4 blocks of 256*8 bits.

The memory is compatible with the I²C standard, two wire serial interface, which uses a bi-directional data bus and serial clock.

The memory carries a built-in 4 bit, unique device identification code (1010) corresponding to the I²C bus definition.

This is used together with 1 chip enable input (E) so that up to 2*8K devices may be attached to the I²C bus and selected individually.

14. CLASS AB STEREO HEADPHONE DRIVER TDA1308

The TDA1308 is an integrated class AB stereo headphone driver contained in a DIP8 plastic package.

The device is fabricated in a 1 mm CMOS process and has been primarily developed for portable digital audio applications.

15. SAW FILTERS

Saw filter type	**:**	**Model:**
K9356M	**:**	PAL-SECAM B/G/D/K/I STEREO (AUDIO IF)
K9656M	**:**	PAL-SECAM B/G/D/K/I/L/L' STEREO (AUDIO IF)
K3958M	**:**	PAL-SECAM B/G/D/K/I/L/L' STEREO (VIDEO IF)

16. IC DESCRIPTIONS AND INTERNAL BLOCK DIAGRAM

? TDA8885
? TUNER (UV1315, UV1316)
? TEA6415C
? TDA 7265
? TDA6108Q
? 74HCT32
? MC44608
? SDA5555
? TDA9181
? TCD1102
? ST24C08
? TDA1308
? PCF8583
? MC33260
? STV9379
? MSP34XXG
? LM358N

16.1. TDA8885:

16.1.1. GENERAL DESCRIPTION

The TDA 8885 is I 2 C-bus controlled singlechip TV processors, which are intended to be applied in PAL/NTSC and multi-standard television receivers. These ICs are largely compatible with the TDA 884X/5X series. Also in this IC family we have versions with a mono intercarrier FM sound channel and versions with a QSS IF amplifier.

The main difference between the TDA 884X/5X series and the TDA 886X/7X/8X series is that the latter contains integrated sound band-pass (in mono FM versions) and trap circuits, a switchable group delay correction circuit and a multi-standard colour decoder which needs only one inexpensive (12 MHz) reference crystal for all standards.

Furthermore various picture improvement features have been included.

16.1.2. FEATURES

- Multi-standard vision IF circuit with an alignment-free PLL demodulator without external components
- Internal (switchable) time-constant for the IF-AGC circuit
- Switchable sound trap and group delay correction circuit for the demodulated CVBS signal
- Flexible source selection with CVBS switch and a Y (CVBS)/C input so that a comb filter can be applied
- Integrated chrominance trap circuit
- Integrated luminance delay line with adjustable delay time
- Integrated chroma band-pass filter with switchable centre frequency

- Colour decoder which needs only one 12 MHz reference crystal (or external clock signal) for all standards
- Blanking of the 'helper signals' for PAL PLUS and EDTV-2
- Several picture improvement features.
- Internal base-band delay line
- YUV interface
- Linear RGB input and fast blanking
- RGB control circuit with 'Continuous Cathode Calibration', white point and black level offset adjustment so that the colour temperature of the dark and the light parts of the screen can be chosen independently.
- Adjustable peak white limiting circuit
- Half-tone (contrast reduction) possibility during mixed-mode of OSD and text signals
- Possibility to insert a 'blue back' option when no video signal is available
- Horizontal synchronisation with two control loops and alignment-free horizontal oscillator
- Vertical count-down circuit
- Vertical driver optimised for DC-coupled vertical output stages for improved geometry
- Vertical geometry processing.
- Low-power start-up for the horizontal drive circuit
- I^2C-bus control of various functions
- QSS sound IF amplifier
- AM sound demodulator
- PAL decoder
- SECAM decoder
- NTSC decoder
- Additional RGB/ YUV input
- Black stretch and Blue stretch
- Dynamic skin tone control and coring on complete video signal
- Video dependent coring and Colour Transient Improvement
- White stretch and green enhancement
- Horizontal geometry (EW)
- Horizontal and vertical zoom
- Horizontal parallelogram and angle correction
- 2 nd CVBS output
- Additional YUV/ RGB input with saturation control
- 2 (I^2C- bus controlled) switch outputs, which can be used to switch external circuits

16.1.3. Pin Description

1	IF input 1
2	IF input 2
3	EHT/overvoltage protection input
4	vertical sawtooth capacitor
5	reference current input
6	ground (vision/QSS IF amplifier and sound)
7	tuner AGC output
8	de-emphasise (front-end sound out) or selected sound out or AM sound in (1) SIF input 1
9	decoupling sound demodulator SIF input 2
10	narrow-band PLL filter AGC sound IF
11	external audio input QSS intercarrier out or AM output or external audio input (2)
12	internally connected
13	half tone (contrast reduction)
14	low-power start-up
15	IF-PLL loop filter
16	IF video output
17	serial clock input
18	serial data input/output
19	white stretch capacitor
20	chrominance input (S-VHS)
21	external CVBS/Y 3 input
22	output switch 1 (I^2C)
23	main supply voltage (+8V) (vision/QSS amplifier, filters, CTI and sound)

24	internal CVBS input
25	ground 1 (colour decoder and synchronisation)
26	CVBS-2 output
27	audio out (volume controlled) / IF video out (3) AM audio output (volume controlled)
28	SECAM PLL decoupling
29	CVBS/Y 2 input
30	black-current input
31	blue output
32	green output
33	red output
34	beam current limiter input/V-guard input
35	red input for insertion
36	green input for insertion
37	blue input for insertion
38	RGB insertion input
39	luminance input
40	luminance output
41	2nd V/R input
42	2nd Y/G input
43	2nd U/B input
44	2nd RGB insertion input
45	U signal output or YUV-RGB insertion input (4)
46	V signal output or Y input or G input (4)
47	U or B signal input (4)
48	V or R signal input (4)
49	Ref. signal out or AVL or V-sync out (5) Ref. signal out or AM out or V-sync out (5)
50	decoupling digital supply
51	12 MHz crystal connection
52	12 MHz crystal connection
53	2nd supply voltage (+8 V) (colour decoder, control, synchronisation and geometry)
54	CVBS-1 output
55	bandgap decoupling
56	horizontal output
57	flyback input / sandcastle output
58	phase-2 filter
59	phase-1 filter
60	output switch 2 (I^2C)
61	ground 2 (filters, CTI, control and geometry)
62	east-west drive output / Automatic Volume Levelling
63	vertical drive B output
64	vertical drive A output

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
Supply					
V_P	supply voltage		8.0		V
I_P	supply current		tbf		mA
Input voltages					
$V_{i(VIF)(rms)}$	video IF amplifier sensitivity (RMS value)		35		V
$V_{i(SIF)(rms)}$	sound IF amplifier sensitivity (RMS value)		60		V
$V_{i(CVBS/Y)(p-p)}$	external CVBS/Y input (peak-to-peak value)		1.0		V
$V_{i(CHROMA)(p-p)}$	external chroma input voltage (burst amplitude)(peak-to-peak value)		0.3		V
$V_{i(RGB)(p-p)}$	RGB inputs (peak-to-peak value)		0.7		V
$V_{i(YI)(p-p)}$	luminance input signal (peak-to-peak value)		1.4/1.0		V
$V_{i(UI)(p-p)}$	U input signal (peak-to-peak value)		1.33/+0.7		V
$V_{i(VI)(p-p)}$	V input signal (peak-to-peak value)		1.05/+0.7		V
Output signals					
$V_{o(IFVO)(p-p)}$	demodulated CVBS output (peak-to-peak value)		2.5		V
$I_{o(AGCOUT)}$	tuner AGC output current range	0		5	mA
$V_{o(QSSO)(rms)}$	sound IF intercarrier output (RMS value)		100		mV
$V_{o(AMOUT)(rms)}$	demodulated AM sound output (RMS value)		500		mV
$V_{o(CVBSO)(p-p)}$	CVBS output voltage video switch (peak-to-peak value)		2.0		V
$V_{o(VO/I)(p-p)}$	? V output/input voltage (peak-to-peak value)		1.05		V

$V_{o(UO/I)(p-p)}$	? U output/input voltage (peak-to-peak value)		1.33	V
$V_{o(YO/I)(p-p)}$	Y output/input voltage (peak-to-peak value)		1.4	V
$V_{o(RGB)(p-p)}$	RGB output signal amplitudes (peak-to-peak value)		2.0	V
$I_{o(HOUT)}$	horizontal output current	10		mA
$I_{o(VERT)}$	vertical output current (peak-to-peak value)		1	mA
$I_{o(EWD)}$	EW drive output current	1.2		mA

16.2. UV1315, UV1316

16.2.1. General description of UV1315:

The UV1315 tuner belongs to the UV 1300 familiy of tuners, which are designed to meet a wide range of applications.
It is a combined VHF, UHF tuner suitable for CCIR systems B/G, H, L, L', I and I'. The low IF output impedance has been
designed for direct drive of a wide variety of SAW filters with sufficient suppression of triple transient.

16.2.2. Features of UV1315:

- Member of the UV1300 family small sized UHF/VHF tuners
- Systems CCIR:B/G, H, L, L', I and I'; OIRT:D/K
- Voltage synthesised tuning (VST)
- Off-air channels, S-cable channels and Hyperband
- Standardised mechanical dimensions and pinning
- Compact size

PINNING		**PIN VALUE**
1. Gain control voltage (AGC)	:	4.0V, Max:4.5V
2. Tuning voltage		
3. High band switch	:	5V, Min:4.75V, Max:5.5V
4. Mid band switch	:	5V, Min:4.75V, Max:5.5V
5. Low band switch	:	5V, Min:4.75V, Max:5.5V
6. Supply voltage	:	5V, Min:4.75V, Max:5.5V
7. Not connected		
8. Not connected		
9. Not connected		
10. Symmetrical IF output 1		
11. Symmetrical IF output 2		

Bandswitching table:

	Pin 3	**Pin 4**	**Pin 5**
Low band	0V	0V	+5V
Mid band	0V	+5V	0V
High band	+5V	0V	0V

16.2.3. General description of UV1316:

The UV1316 tuner belongs to the UV 1300 family of tuners, which are designed to meet a wide range of applications.
It is a combined VHF, UHF tuner suitable for CCIR systems B/G, H, L, L', I and I'. The low IF output impedance has been designed
for direct drive of a wide variety of SAW filters with sufficient suppression of triple transient.

16.2.4. Features of UV1316:

- Member of the UV1300 family small sized UHF/VHF tuners
- Systems CCIR: B/G, H, L, L', I and I'; OIRT: D/K
- Digitally controlled (PLL) tuning via I2C-bus
- Off-air channels, S-cable channels and Hyperband
- World standardised mechanical dimensions and world standard pinning

- Compact size
- Complies to “CENELEC EN55020” and “EN55013”

PINNING	PIN VALUE
1. Gain control voltage (AGC)	: 4.0V, Max:4.5V
2. Tuning voltage	
3. I²C-bus address select	: Max:5.5V
4. I²C-bus serial clock	: Min:-0.3V, Max:5.5V
5. I²C-bus serial data	: Min:-0.3V, Max:5.5V
6. Not connected	
7. PLL supply voltage	: 5.0V, Min:4.75V, Max:5.5V
8. ADC input	
9. Tuner supply voltage	: 33V, Min:30V, Max:35V
10. Symmetrical IF output 1	
11. Symmetrical IF output 2	

16.3. TEA6415C:

16.3.1. General Description:

The main function of the TEA6415C is to switch 8 video input sources on the 6 outputs.
Each output can be switched to only one of the inputs whereas but any same input may be connected to several outputs.
All switching possibilities are controlled through the I2C-bus.

16.3.2. Features:

- 20 MHz Bandwidth
- Cascadable with another TEA6415C (Internal address can be changed by pin 7 voltage)
- 8 inputs (CVBS, RGB, Mac, CHROMA, …)
- 6 Outputs
- Possibility of MAC or chroma signal for each input by switching-off the clamp with an external resistor bridge
- Bus controlled
- 6.5dB gain between any input and output
- -55dB crosstalk at 5MHz
- Fully ESD protected

PINNING	PIN VALUE				
1. Input	: Max	: 2Vpp, Input Current	: 1mA,	Max	: 3mA
2. Data	: Low level	: -0.3V Max:1.5V, High level	: 3.0V	Max	: Vcc+0.5V
3. Input	: Max	: 2Vpp, Input Current	: 1mA,	Max	: 3mA
4. Clock	: Low level	: -0.3V Max:1.5V, High level	: 3.0V	Max	: Vcc+0.5V
5. Input	: Max	: 2Vpp, Input Current	: 1mA,	Max	: 3mA
6. Input	: Max	: 2Vpp, Input Current	: 1mA,	Max	: 3mA
7. Prog					
8. Input	: Max	: 2Vpp, Input Current	: 1mA,	Max	: 3mA
9. Vcc	: 12V				
10. Input	: Max	: 2Vpp, Input Current	: 1mA,	Max	: 3mA
11. Input	: Max	: 2Vpp, Input Current	: 1mA,	Max	: 3mA
12. Ground					
13. Output	: 5.5Vpp,	Min : 4.5Vpp			
14. Output	: 5.5Vpp,	Min : 4.5Vpp			
15. Output	: 5.5Vpp,	Min : 4.5Vpp			
16. Output	: 5.5Vpp,	Min : 4.5Vpp			
17. Output	: 5.5Vpp,	Min : 4.5Vpp			
18. Output	: 5.5Vpp,	Min : 4.5Vpp			
19. Ground					
20. Input	: Max : 2Vpp, Input Current		: 1mA,	Max	: 3mA

16.4. TDA7265:

The TDA7265 is a 25W+25W stereo sound amplifier with mute/stand-by facility. STPA control signal coming from microcontroller (when it is at high level) activates the mute function. IC is muted when mute port is at low level. Two stereo audio signals coming from audio module is injected to the inputs of the IC and a power of 12Wrms (10%) is obtained. An external pop-noise circuitry pulls AF inputs of the IC in order to eliminate pop noise when TV is turned on or off via mains supply connection. It is possible to adjust the gain of the amplifiers by feedback external resistors.

16.4.1. Features:

- Wide supply voltage range (up to 50V ABS Max.)
- Split supply
- High output power: 25+25 W @ TDA = 10%, R_L = 8ohm, V_S = ±20V
- No pop at turn-on / off
- Mute (pop free)
- Stand-By feature (low I_Q)
- Few external components
- Thermal overload protection
- Adjustable gain via an external resistor

16.4.2. Pinning:

1. Output (1)
2. +Vs
3. Output (2)
4. Mute / St-By
5. -Vs
6. Input (2)
7. Ground
8. Input (1)

16.5. TDA6108Q:

The TDA6108Q consists of three monolithic video output amplifiers. The amplifier can be seen as an operational amplifier with negative feedback. The advantage of negative feedback is that the amplifier characteristics do not play an important role up to certain frequencies. The internal flash diodes protect the amplifiers against flash over in the picture tube. The only protections required at the cathode outputs are a flash resistor and a spark gap. Furthermore, the device needs only one power supply voltage (Vdd). The TDA6108Q is provided with a black current data pin.

16.5.1. Features:

- No external components, only the well known supply decoupling
- Very simple application with a variety of colour decoders
- Black-current measurement output for automatic black current stabilisation
- Only one supply voltage needed
- Internal protection against positive appearing CRT flash-over discharges
- Protection against ESD
- Internal reference voltage
- Thermal protection
- Controllable switch-off behaviour
- Very small PCB dimensions
- Very high replacement value

PINNING	**PIN VALUE**
1. Inverting input 1	:2Vpp
2. Inverting input 2	:2Vpp
3. Inverting input 3	:2Vpp
4. Ground	
5. BSC-output	:Max:7V

6. Supply voltage	:200VDC
7. Cathode output 3	:20mA, 100Vpp
8. Cathode output 2	:20mA, 100Vpp
9. Cathode output 1	:20mA, 100Vpp

16.6. 74 HCT 32

The 74HC/HCT32 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC. The 74HC/HCT32 provide the 2-input OR function.

16.6.1. PINNING

1, 4, 9, 12	: 1A to 4A data inputs
2, 5, 10, 13	: 1B to 4B data inputs
3, 6, 8, 11	: 1Y to 4Y data outputs
7	: GND ground (0 V)
14	: V_{CC} positive supply voltage

For HC the condition is V_I = GND to V_{CC}
For HCT the condition is V_I = GND to V_{CC} ? ? 1.5 V

16.7. MC44608

16.7.1. General description:

The MC44608 is a high performance voltage mode controller designed for off–line converters. This high voltage circuit that integrates the start–up current source and the oscillator capacitor, requires few external components while offering a high flexibility and reliability.
The device also features a very high efficiency stand–by management consisting of an effective Pulsed Mode operation. This technique enables the reduction of the stand–by power consumption to approximately 1W while delivering 300mW in a 150W SMPS.

• Integrated start–up current source
• Lossless off–line start–up
• Direct off–line operation
• Fast start–up

16.7.2. General Features

• Flexibility
• Duty cycle control
• On chip oscillator switching frequency 40, or 75kHz
• Secondary control with few external components

Protections

• Maximum duty cycle limitation
• Cycle by cycle current limitation
• Demagnetisation (Zero current detection) protection
• “Over V CC protection” against open loop
• Programmable low inertia over voltage protection against open loop
• Internal thermal protection

GreenLine Controller

• Pulsed mode techniques for a very high efficiency low power mode
• Lossless start-up
• Low dV/dT for low EMI radiation's

PINNING	**PIN VALUE**
1. Demagnetisation	Zero cross detection voltage: 50 mV typ.
2. I Sense	Over current protection voltage 1V typ.

3. Control Input	Min: 7.5V Max.: 18V
4. Ground	Iout $2A_{p-p}$ during scan $1.2A_{p-p}$ during flyback
5. Driver	Output resistor 8.5 Ohm sink 15 Ohm source typ.
6. Supply voltage	Max:16V (Operating range 6.6V-13V)
7. No connection	
8. Line Voltage	Min:50V Max:500V

16.8. SDA5555:

16.8.1. General description:

• Feature selection via special function register
• Simultaneous reception of TTX, VPS, PDC, and WSS (line 23)
• Supply Voltage 2.5 and 3.3 V

PINNING

1	Comb Filter Standard Selection 1	Low Level : 0V	High Level : 3.3 V
2	Key 2	Low Level : 0V	High Level : 3.3 V
3	Key 1	Low Level : 0V	High Level : 3.3 V
4	Loc.key.switch input	Low Level : 0V	High Level : 3.3 V
5	Loc.key.switch input	Low Level : 0V	High Level : 3.3 V
6	Loc.key.switch input	Low Level : 0V	High Level : 3.3 V
7	Loc.key.switch input	Low Level : 0V	High Level : 3.3 V
8	Mute output	Low Level : 0V	High Level : 3.3 V
9	Digital supply voltage	2.5 V	
10	Ground		
11	Digital supply voltage	3.3 V	
12	CVBS input	1 Vpp	
13	Analogue supply voltage	2.5 V	
14	Analogue ground		
15	Wake Interrupt	Low Level : 0V	High Level : 3.3 V
16	AV-1 status input	Low Level : 0V	High Level : 3.3 V
17	AV-2 status input	Low Level : 0V	High Level : 3.3 V
18	Shortcut protection	Low Level : 0V	High Level : 3.3 V
19	SAND input	Low Level : 0V	High Level : 3.3 V
20	ODD/EVEN output	Low Level : 0V	High Level : 3.3 V
21	DVD 12 V Sense	Low Level : 0V	High Level : 3.3 V
22	Not used		
23	Idle Off	Low Level : 0V	High Level : 3.3 V
24	IR-input	Low Level : 0V	High Level : 3.3 V
25	Data output	Low Level : 0V	High Level : 3.3 V
26	Clock signal output	Low Level : 0V	High Level : 3.3 V
27	Stand-By Mode selection	Low Level : 0V	High Level : 3.3 V
28	Not used		
29	Ground		
30	Digital supply voltage	3.3 V	
31	Write Protect output	Low Level : 0V	High Level : 3.3 V
32	Service output	Low Level : 0V	High Level : 3.3 V
33	Reset output	Low Level : 0V	High Level : 3.3 V
34	6 MHz cristal connection 2	Low Level : 0V	High Level : 3.3 V
35	6 MHz cristal connection 1	Low Level : 0V	High Level : 3.3 V
36	Analogue ground		
37	Analogue supply voltage	2.5 V	
38	OSD-Red output	0.7 Vpp to 1.2 Vpp	

39	OSD-Green output	0.7 Vpp to 1.2 Vpp	
40	OSD-Blue output	0.7 Vpp to 1.2 Vpp	
41	OSD-Blanking output	Low Level : 0V	High Level : 3.3 V
42	Digital supply voltage	2.5 V	
43	Ground		
44	Digital supply voltage	3.3 V	
45	PAL / SECAM	Low Level : 0V	High Level : 3.3 V
46	Degauss	Low Level : 0V	High Level : 3.3 V
47	Horizontal Trapezoid	Low Level : 0V	High Level : 3.3 V
48	Tilt	Low Level : 0V	High Level : 3.3 V
49	Not used		
50	Micro s. select	Low Level : 0V	High Level : 3.3 V
51	Comb Filter Standard Selection 2	Low Level : 0V	High Level : 3.3 V
52	SVHS Sense	Low Level : 0V	High Level : 3.3 V

16.9. TDA9181:

Pin#:

Pin-1 = Cýn=Chrominance input signal
Pin-2 = INPSEL=input switch select input
Pin-3 =Y/CVBS2=luminance or CVBS input signal 2
Pin-4 = Digital GND
Pin-5= VDD=digital supply voltage
Pin-6=VCC=analog supply voltage
Pin-7 =SC=sandcastle input signal
Pin-8 =FSCSEL=color subcarrier select input
Pin-9 = FSC=color subcarrier input signal
Pin-10 =SYS2=standart select 2 input
Pin-11 = SYS1=standart select 1 input
Pin-12 =Y/CVBS1=luminance or CVBS input signal
Pin-13 = analogue GND
Pin-14 = Y/CVBSout=luminance or CVBS output signal
Pin-15 =OUTSEL=output switch select input
Pin-16 =Cout=chrominance output signal

16.9.1. General Features:

-One chip multistandart adaptive comb filter
-Cross luminance reduction
-Cross colour reduction
-No chroma trap, so sharper vertical luminance
-Analogue discrete-time signal processing, so no quantization noise
-Anti aliasing and reconstruction filters are included
-Input switch selects between two Y/CVBS inputs
-Output switch selects between combed CVBS and an external Y/C source
-Fsc as well as 2*fsc colour subcarrier signal may be applied
-Alignment free
-Few external components
-Low power

16.9.2. Limits:

-Analogue supply voltage Vcc=5.5V(max)
-Analogue supply current Icc=25mA(typ)
-Digital supply voltage Vdd=5.5(V)(max)
-Digital supply current Idd=10Ma(typ)
-Luminance or CVBS input signal (p-p) Y/CVBS1, 2 1.4V(max)

-Chrominance input signal (p-p) Cin=1.0V(max)

16.10. TCD1102:

16.10.1. Description

The TCET110./ TCET2100/ TCET4100 consists of a phototransistor optically coupled to a gallium arsenide infrared emitting diode in a 4-lead plastic dual inline package. The elements are mounted on one leadframe using a
coplanar technique, providing a fixed distances between input and output for highest safety requirements.

16.10.2. Applications

Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):
For appl. class I – IV at mains voltage ? 300 V
For appl. class I – III at mains voltage ? 600 V
according to VDE 0884, table 2, suitable for:
Switch-mode power supplies, line receiver, computer peripheral interface, microprocessor system interfaces.

VDE 0884 related features:
Rated impulse voltage (transient overvoltage) V_{IOTM} = 8 kV peak
Isolation test voltage (partial discharge test voltage) V_{pd} = 1.6 kV
Rated isolation voltage (RMS includes DC) V_{IOWM} = 600 V_{RMS} (848 V peak)
Rated recurring peak voltage (repetitive) V_{IORM} = 600 V_{RMS}

16.10.3. General features:

CTR offered in 9 groups
Isolation materials according to UL94-VO
Pollution degree 2 (DIN/VDE 0110 / resp. IEC 664)
Climatic classification 55/100/21 (IEC 68 part 1)
Special construction: Therefore, extra low coupling capacity of typical 0.2 pF, high **C**ommon **M**ode **R**ejection
Low temperature coefficient of CTR
G = Leadform 10.16 mm; provides creepage distance > 8 mm, for TCET2100/ TCET4100 optional; suffix letter ‘G’ is not marked on the optocoupler
Coupling System U

16.11. ST24C08:

16.11.1. General description:

The ST24C08 is an 8Kbit electrically erasable programmable memory (EEPROM), organised as 4 blocks of 256 * 8 bits.
The memory operates with a power supply value as low as 2.5V. Both Plastics Dual-in-Line and Plastic Small Outline packages
are available.

16.11.2. Features:

- Minimum 1 million ERASE/WRITE cycles with over 10 years data retention
- Single supply voltage:4.5 to 5.5V
- Two wire serial interface, fully I2C-bus compatible
- Byte and Multibyte write (up to 8 bytes)

- Page write (up to 16 bytes)
- Byte, random and sequential read modes
- Self timed programming cycle

PINNING	PIN VALUE
1. Write protect enable (Ground)	: 0V
2. Not connected (Ground)	: 0V
3. Chip enable input (Ground)	: 0V
4. Ground	: 0V
5. Serial data address input/output	: Input LOW voltage : Min : -0.3V, Max : 0.3*Vcc Input HIGH voltage: Min : 0.7*Vcc, Max : Vcc+1
6. Serial clock	: Input LOW voltage : Min: -0.3V, Max : 0.3*Vcc Input HIGH voltage: Min : 0.7*Vcc, Max : Vcc+1
7. Multibyte/Page write mode	: Input LOW voltage : Min: -0.3V, Max :0.5V Input HIGH voltage: Min : Vcc-0.5, Max : Vcc+1
8. Supply voltage	: Min : 2.5V, Max : 5.5V

16.12. TDA1308:

16.12.1. Features:

- Wide temperature range
- No switch ON/OFF clicks
- Excellent power supply ripple rejection
- Low power consumption
- Short-circuit resistant
- High performance
  - high signal-to-noise ratio
  - high slew rate
  - low distortion
- Large output voltage swing

PINNING	PIN VALUE
1. Output A (Voltage swing)	: Min : 0.75V, Max : 4.25V
2. Inverting input A	: Vo(clip) : Min : 1400mVrms
3. Non-inverting input A	: 2.5V
4. Ground	: 0V
5. Non-inverting input B	: 2.5V
6. Inverting input B	: Vo(clip) : Min : 1400mVrms
7. Output B (Voltage swing)	: Min : 0.75V, Max : 4.25V
8. Positive supply	: 5V, Min : 3.0V, Max : 7.0V

16.13. PCF8583:

16.13.1. FEATURES

- I 2 C-bus interface operating supply voltage: 2.5 V to 6 V
- Clock operating supply voltage (0 to +70 ? C):1.0 V to 6.0 V
- 240 8-bit low-voltage RAM
- Data retention voltage: 1.0 V to 6 V
- Operating current (at f_{SCL} = 0 Hz): max. 50 ? A
- Clock function with four year calendar
- Universal timer with alarm and overflow indication
- 24 or 12 hour format
- 32.768 kHz or 50 Hz time base
- Serial input/output bus (I 2 C)
- Automatic word address incrementing
- Programmable alarm, timer and interrupt function
- Slave address:
  – READ: A1 or A3
  – WRITE: A0 or A2.

16.13.2. GENERAL DESCRIPTION

The PCF8583 is a clock/calendar circuit based on a 2048-bit static CMOS RAM organised as 256 words by 8 bits. Addresses and data are transferred serially via the two-line bi-directional I 2 C-bus. The built-in word address register is incremented automatically after each written or read data byte. Address pin A0 is used for programming the hardware address, allowing the connection of two devices to the bus without additional hardware. The built-in 32.768 kHz oscillator circuit and the first 8 bytes of the RAM are used for the clock/calendar and counter functions. The next 8 bytes may be programmed as alarm registers or used as free RAM space. The remaining 240 bytes are free RAM locations.

SYMBOL PIN DESCRIPTION

OSCI	1	oscillator input, 50 Hz or event-pulse input
OSCO	2	oscillator output
A0	3	address input
V_{SS}	4	negative supply
SDA	5	serial data line
SCL	6	serial clock line
INT	7	open drain interrupt output (active LOW)
V_{DD}	8	positive supply

16.14. MC33260:

16.14.1. General Features:

-Standard Constant Output Voltage or "Follower Boost" Mode
-Switch Mode Operation: Voltage Mode
-Latching PWM for Cycle–by–Cycle On–Time Control
-Constant On–Time Operation That Saves the Use of an Extra Multiplier
-Totem Pole Output Gate Drive
-Undervoltage Lockout with Hysteresis
-Low Start–Up and Operating Current
-Improved Regulation Block Dynamic Behaviour
-Synchronisation Capability
-Internally Trimmed Reference Current Source

16.14.2. Safety Features:

-Overvoltage Protection: Output Overvoltage Detection
-Undervoltage Protection: Protection Against Open Loop
-Effective Zero Current Detection
-Accurate and Adjustable Maximum On–Time Limitation
-Overcurrent Protection
-ESD Protection on Each Pin

16.14.3. LIMITS:

-Vcc MAX voltage 16V
-Gate drive current source=-500mA, sink=500mA
-Input voltage –0.3V to +1.0V
-Operating junction Temperature +150 C

16.14.4. PINNING

Pin1=Feedback input
Pin2=Vcontrol
Pin3=Oscillator capacitor(Ct)

Pin4=Current Sense Input
Pin5=Synchronization Input
Pin6=GND
Pin7=Gate Drive
Pin8=Vcc

16.15. STV9379:

16.15.1. DESCRIPTION

Designed for monitors and high performance TVs, the STV9379FA vertical deflection booster can handle flyback voltage up to 90V. Further to this, it is possible to have a flyback voltage, which is more than the double of the supply (Pin 2). This allows to decrease the power consumption, or to decrease the flyback time for a given supply voltage.
The STV9379FA operates with supplies up to 42V and provides up to 2.6A$_{PP}$ output current to drive the yoke.
The STV9379FA is offered in HEPTAWATT package.

16.15.2. PINNING

Pin1 : Output Stage Supply
Pin2 : Output
Pin3 : GND or Negative Supply
Pin4 : Flyback Supply
Pin5 : Supply Voltage
Pin6 : Inverting Input
Pin7 : Non-inverting Input

16.16. MSP34XX :

MSP3410D
The MSP3410D is an I2C controlled single-chip multistandard sound processor for applications in analog and digital TV sets. The full TV sound processing, starting with analog sound IF signal-in, down to processed analog AF-out is performed in a single-chip covering all European TV-standards. It is designed to simultaneously perform digital demodulation and decoding of NICAM-coded TV stereo sound, as well as demodulation of FM-mono TV sound and two FM systems according to the German or Korean terrestrial specs. It is also possible to do AM-demodulation according to the SECAM system. There is AGC for analog inputs: 0.14 - 3Vpp. All demodulation and filtering is performed on chip and is individually programmable. All digital NICAM standards (B/G, L, and I) are realised. Only one crystal clock (18.432Mhz) is necessary. External capacitors at each crystal pin to ground are required. They are necessary for tuning the open-loop frequency of the internal PLL and for stabilising the frequency in closed-loop operation. The higher the capacitors, the lower the clock frequency result. The nominal free running frequency should match the centre of the tolerance range between 18.433 and 18.431Mhz as closely as possible. By means of standardised I2S interface, additional feature processors (DPL35xx, Dolby Prologic processor for this chassis) can be connected to the IC.
I2S bus interface consists of five pins:

I2S_DA_IN1…2	for input four channels (two channels per line) per sampling cycle (32Khz).
I2DA_OUT,	for output, two channels per sampling cycle (32KHz).
I2S_CL,	for timing of the transmission of I2S serial data, 1.024Mhz.
I2S_WS,	for the word strobe line defining the left and right sample.

Features:
- 5-band graphic equalizer (as in MSP3400C)
- Enhanced spatial affect (pseudo stereo / base-width enlargement as in MSP3400C)
- Headphone channel with balance, bass treble, loudness
- Balance for loudspeaker and headphone channels in dB units (optional)

- Additional pair of D/A converters for SCART2 out
- Improved over-sampling filters (as in MSP 3400C)
- Additional SCART input
- Full SCART in/out matrix without restrictions
- SCART volume in dB units (optional)
- Additional I²S input (as in MSP 3400C)
- New FM-identification (as in MSP 3400C)
- Demodulator short programming
- Auto-detection for terrestrial TV-sound standards
- Precise bit-error rate indication
- Automatic switch from NICAM to FM/AM or vice versa
- Improved NICAM synchronisation algorithm
- Improved carrier mute algorithm
- Improved AM-demodulation
- ADR together with DRP 3510A
- Dolby Pro Logic together with DPL 35xx A
- Reduction of necessary controlling
- Less external components
- Significant reduction of radiation

Pinning:

1. ADR wordstrobe
2. Not connected
3. ADR data output
4. I²S 1 data input
5. I²S data output
6. I²S wordstrobe
7. I²S clock
8. I²S data
9. I²S clock
10. Not connected
11. Standby (low-active)
12. I²C Bus address select
13. Digital control output 0
14. Digital control output 1
15. Not connected
16. Not connected
17. Not connected
18. Audio clock output
19. Not connected
20. Crystal oscillator
21. Crystal oscillator
22. Test Pin
23. IF input 2 (if ANA_IN1+is used only, connect 50 pF capacitor)
24. IF common
25. IF input 1
26. Analog power supply +5V
27. Analog ground
28. Mono input
29. Reference voltage IF A/D converter
30. Scart input 1 in, right
31. Scart input 1 in, left
32. Analog Shield Ground 2
33. Scart input 2 in, right
34. Scart input 2 in, left
35. Analog Shield Ground 1
36. Scart input 3 in right
37. Scart input 3 in left
38. Analog Shield Ground 4
39. Scart input 4 in, right
40. Scart input 4 in, left
41. Not connected
42. Analog reference voltage high voltage part
43. Analog ground
44. Volume capacitor MAIN
45. Analog power supply 8.0V
46. Volume capacitor AUX
47. Scart output 1, left
48. Scart output 1, right
49. Reference ground 1 high voltage part
50. Scart output 2, left
51. Scart output 2, right
52. Analog Shield Ground 3
53. Not connected
54. Not connected
55. Not connected
56. Analog output MAIN, left
57. Analog output MAIN, right to AVSS with
58. Reference ground 2 high voltage part
59. Analog output AUX, left
60. Analog output AUX, right
61. Power-on-reset
62. Not connected
63. Not connected
64. Not connected
65. I²S2-data input
66. Digital ground
67. Digital power supply +5V
68. ADR clock

16.17. LM358N:

16.17.1. General Description

The LM158 series consists of two independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. Application areas include transducer amplifiers, dc gain blocks and all the conventional op amp circuits, which now can be more easily implemented in single power supply systems. For example, the LM158 series can be directly operated off of the standard +5V power supply voltage, which is used in digital systems and will easily provide the required interface electronics without requiring the additional ±15V power supplies.

16.17.2. Unique Characteristics

In the linear mode the input common-mode voltage range includes ground and the output voltage can also swing to ground, even though operated from only a single power supply voltage.
The unity gain cross frequency is temperature compensated.
The input bias current is also temperature compensated.

16.17.3. Advantages

Two internally compensated op amps
Eliminates need for dual supplies
Allows direct sensing near GND and V_{OUT} also goes to GND
Compatible with all forms of logic
Power drain suitable for battery operation
Pin-out same as LM1558/LM1458 dual op amp

16.17.4. Features

Available in 8-Bump micro SMD chip sized package, Internally frequency compensated for unity gain n Large dc voltage gain: 100 dB
Wide bandwidth (unity gain): 1 MHz (temperature compensated)
Wide power supply range:
— Single supply: 3V to 32V
— or dual supplies: ±1.5V to ±16V
Very low supply current drain (500 µA) —essentially independent of supply voltage
Low input offset voltage: 2 mV
Input common-mode voltage range includes ground
Differential input voltage range equal to the power supply voltage
Large output voltage swing: 0V to V + þ 1.5V

17. AK33 CHASSIS MANUAL ADJUSTMENTS PROCEDURE

In order to enter the service menu, first enter the installation menu and then press the digits 4, 7, 2 and 5 respectively.

For ADJUST settings:
Select **Adjust** using or button and press or button to enter it. To select different adjust parameters, use or button. To change the selected parameter, use or button.

WHITE BALANCE ADJUSTMENT:

The following three parameters are used to make white balance adjustment. To do this, use a Colour Analyser. Using white point RED, white point GREEN and white point BLUE parameters, insert the + sign in the square which is in the middle of the screen.
ADJUST 00 = White Point RED
ADJUST 01 = White Point GREEN
ADJUST 02 = White Point BLUE

AGC ADJUSTMENT:

In order to do AGC adjustment, enter a 60dBmV RF signal level from channel C-12.
Connect a digital voltmeter to pin 1 of the tuner. Change the AGC parameter until you see 3.70VDC on voltmeter display. Check that picture is normal at 90dBmV signal level.
ADJUST 03 = AGC

IF-PLL NEGATIVE ADJUSTMENT (Only with PLL tuner):

Connect 38.9 MHz test pattern for PAL B/G, PAL-SECAM B/G, 39.5 MHz test pattern for PAL I or 45.75 MHz test pattern for
PAL M/N, NTSC M model to Z401 SAW filter input terminals. Change the IF-PLL Negative parameter until you see IN, DOWN below. If you cannot catch IN, DOWN position this way, using a screwdriver rotate the VIF-COIL LT401 left or right until you
see IN, DOWN.
ADJUST 04 = IF-PLL Negative

IF-PLL POSITIVE ADJUSTMENT (Only with PLL tuner):
Connect 33.9 MHz test pattern for SECAM L' model to Z401 SAW filter input terminals. Change the IF-PLL Positive parameter
until you see IN, DOWN below. If you cannot catch IN, DOWN position this way, using a screwdriver rotate the VIF-COIL LT401
left or right until you see IN, DOWN.
ADJUST 05 = IF-PLL Positive

LUMINANCE DELAY ADJUSTMENT (with only TDA 8844 video processor):
ADJUST 06 = Y-Delay PAL
Enter a PAL B/G colour and black-white bar test pattern via RF. Adjust Y-Delay PAL till the colour transients on the colour bar of
the pattern become as sharper and colours between transients do not mix with each other as possible.
Note: If the SAW filter is one of the G1965M, J1951M, J3950M, K2958M, K2962M, G3957M, K6256K, K6259K or M1963M, there is constant group delay distortion, so for an equal delay of the luminance and chrominance signal the delay must be set at a
value of 160nS. This means the adjustment must be set to the maximum value.
ADJUST 07 = Y-Delay SECAM
Enter a SECAM B/G colour and black-white bar test pattern via RF. Adjust Y-Delay SECAM till the colour transients on the colour bar of the pattern become as sharper and colours between transients do not mix with each other as possible.
Note: If the SAW filter is one of the G1965M, K2958M, K2962M, G3957M, K6256K or K6259K, there is constant group delay distortion, so for an equal delay of the luminance and chrominance signal the delay must be set at a value of 160nS.
This means the adjustment must be set to the maximum value.
ADJUST 08 = Y-Delay NTSC
Enter an NTSC colour and black-white bar test pattern via RF. Adjust Y-Delay NTSC till the colour transients on the colour bar
of the pattern become as sharper and colours between transients do not mix with each other as possible.
Note: If the SAW filter is M1963M, there is constant group delay distortion, so for an equal delay of the luminance and chrominance signal the delay must be set at a value of 160nS. This means the adjustment must be set to the maximum value.
ADJUST 09 = Y-Delay Other
In case of other colour systems, enter this system with colour and black-white bar test pattern via RF. Adjust Y-Delay Other till the colour transients on the colour bar of the pattern become as sharper and colours between transients do not mix with each other
as possible. Normally for an equal delay of the luminance and chrominance signal the delay must be set at a value of 160nS.
This means the adjustment must be set to the maximum value.

VERTICAL ZOOM ADJUSTMENT (only for 110ø picture tubes):
ADJUST 10 = Vertical Zoom
Enter a PAL B/G circle test pattern via RF. Change vertical zoom till you see the upper and lower limit of the circle as close to the upper and lower limit of the picture tube as possible.

VERTICAL SCROLL ADJUSTMENT (only for 110ø picture tubes):
ADJUST 11 = Vertical Scroll
Enter a PAL B/G circle test pattern via RF. Change vertical scroll till you see the circle exactly in the middle of the screen.

4:3 HORIZONTAL SHIFT ADJUSTMENT:
ADJUST 12 = 4 : 3 Horizontal Shift
Enter a RED PURITY test pattern via RF. Change horizontal shift till the picture is horizontally centred. Check whether this adjustment is correct after completing Service Mode Adjustment.

4:3 VERTICAL SLOPE ADJUSTMENT:
ADJUST 13 = 4 : 3 Vertical Slope

Enter a CROSS-HATCH B/G test pattern via RF. Change vertical slope till the size of squares on both the upper and lower part
of test pattern become equal to the squares laying on the vertical centre of the test pattern. Check and readjust VERTICAL
SLOPE item if the adjustment becomes improper after some other geometric adjustments are done.

4:3 VERTICAL AMPLITUDE ADJUSTMENT:

ADJUST 14 = 4 : 3 Vertical Amplitude

Enter a PAL B/G test pattern via RF. Change vertical slope till horizontal black lines on both the upper and lower part of the test pattern become very close to the upper and lower horizontal sides of picture tube and nearly about to disappear. Check and readjust VERTICAL AMPLITUDE item if the adjustment becomes improper after some other geometric adjustments are done.

4:3 S-CORRECTION ADJUSTMENT:

ADJUST 15 = 4 : 3 S-Correction

Enter a PAL B/G circle test pattern via RF. Change S-correction till the middle part of the circle is as round as possible.

4:3 VERTICAL SHIFT ADJUSTMENT:

ADJUST 16 = 4 : 3 Vertical Shift

Enter a PAL B/G test pattern via RF. Change Vertical Shift till the test pattern is vertically centred, i.e. horizontal line at the centre pattern is in equal distance both to upper and lower side of the picture tube. Check and readjust Vertical Shift item if the adjustment becomes improper after some other geometric adjustments are done.

4:3 EW WIDTH ADJUSTMENT (only for 110ø picture tubes):

ADJUST 17 = 4 : 3 EW Width

Enter a PAL B/G test pattern via RF. Change EW Width till the vertical black and white bars on both left and right side of the
pattern exactly disappear.

4:3 EW PARABOLA WIDTH ADJUSTMENT (only for 110ø picture tubes):

ADJUST 18 = 4 : 3 EW Parabola Width

Enter a PAL B/G test pattern via RF. Change EW Parabola Width till vertical lines close to the both sides of the picture frame become parallel to vertical sides of picture tube. Check and readjust EW Parabola Width item if the adjustment becomes improper after some other geometric adjustments are done.

4:3 EW UPPER CORNER PARABOLA ADJUSTMENT (only for 110ø picture tubes):

ADJUST 19 = 4 : 3 EW Corner Parabola

Enter a PAL B/G test pattern via RF. Change EW Upper Corner Parabola till vertical lines at the corners of both sides of picture frame become vertical and parallel to vertical corner sides of picture tube. Check and readjust EW Upper Corner Parabola item if the adjustment becomes improper after some other geometric adjustments are done.

4:3 EW TRAPEZIUM ADJUSTMENT :

ADJUST 20 = 4 : 3 EW Trapezium

Enter a PAL B/G test pattern via RF. Change EW Trapezium till vertical lines, especially lines at the sides of the picture frame became parallel to the both sides of picture tube as close as possible. Check and readjust EW Trapezium item if the adjustment becomes improper after some other geometric adjustments are done.

HORIZONTAL PARALLELOGRAM:

ADJUST 21 = Horizontal Parallelogram

Enter a PAL B/G test pattern via RF. Change Horizontal Parallelogram to set vertical lines orthogonal to the horizontal lines Check and readjust Horizontal Parallelogram item if the adjustment becomes improper after some other geometric adjustments are done.

BOW :

ADJUST 22 = Bow

Enter a PAL B/G test pattern via RF. Change Bow to straighten the vertical lines. Check and readjust Bow item if the adjustment becomes improper after some other geometric adjustments are done.

4:3 EW LOWER CORNER PARABOLA ADJUSTMENT (only for 110ø picture tubes):

ADJUST 23 = 4 : 3 EW Lower Corner Parabola

Enter a PAL B/G test pattern via RF. Change EW Lower Corner Parabola till vertical lines at the corners of both sides of picture frame become vertical and parallel to vertical corner sides of picture tube. Check and readjust EW Lower Corner Parabola item if the adjustment becomes improper after some other geometric adjustments are done.

**remark that some adjustments are fixed to default values in order to get correct geometry in all picture modes(4:3,16:9,Cinema,Subtitle,Super zoom)

GENERAL BLOCK DIAGRAM OF CHASSIS 11 AK 33